FAA-E-2592a

SUPPLEMENT 1

FINAL

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DEPARTMENT OF **TRANSPORTATION**

FEDERAL AVIATION ADMINISTRATION SPECIFICATION

MOSAIC SOFTWARE FOR

EN-ROUTE AUTOMATED **RADAR TRACKING SYSTEM(EARTS)**

This supplement forms a part of specification FAA-E-2592a dated July 1, 1976, when so specified in specifications, requests for proposals, invitations for bids or contracts.

INTRODUCTION

1.1 PURPOSE

The original design of the EARTS system allowed for five radars with the capability to expand to a maximum configuration of 15 radars; however, in this configuration, at least one display is required for each radar. The EARTS shall have the capability to receive radar data from up to 15 sensors, and, furthermore, present the data from multiple radars on a single display. This expansion will require more system resources such as processors and memory in order to perform the functions of tracking and display output. There is an urgent requirement to implement a form of the NAS mosaic software concept into EARTS and be able to track and display in a mosaic manner. For commonality, this mosaic software will be utilized at all EARTS facilities.

1.2 SCOPE

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DOCUMENTATION

2.1 GOVERNMENT SPECIFICATIONS AND STANDARDS

(a) FAA-E-2592a	EARTS Specification, July 1, 197 6
(b) NAS-MD-320	Multiple Radar Data Processing, December 17, 1980
(c) NAS-MD-321	Automatic Tracking, December 17, 1980
(d) NAS-MD-318	Performance Criteria, December 17, 1980
(e) NAS-MD-325	Software Design Requirements, April 14, 1980
(f) NAS-MD-323	Dynamic Simulation of Radar Data, April 14, 1980
(g) NAS-MD-322	Real Time Quality Control of Radar Data, December 17, 1980
(h) NASP-5105-15	NAS En Route Stage A - Application Subsystems, (Vol. II) September 24, 1979
(i) NASP-5149-17	NAS En Route Stage A, Subsystem Design Data, Radar Processing and Tracking Subsystem, December 17, 1980
(j) FAA-E-2594a	NY TRACON Specification, July 1, 1976

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The RTQC function will contain the following set of six tasks:

(1) Status Message Monitoring-The monitoring of the status messages from the CD in order to detect if any status messages changes, messages were excessive or messages- were missing.

(2) Test Message Monitoring-The monitoring of test messages from the CD in order to determine missing conditions, excessive conditions or the correctness of the fixed beacon test and fixed primary test messages received from each site.

(3) Radar Data counts-The analysis of radar data counts in order to detect missing or excessive numbers of radar data or excessive numbers of radar data error conditions.

(4) Registration Analysis-The calculation of registration errors between discrete beacon returns and the true target positions for a radar site.

(5) Collimation Analysis-The calculation of collimation errors between primary and beacon returns on the same target for a radar site.

(6) Permanent Echo Verification-The calculation of errors between the adapted physical location of permanent echo target and the location of their associated radar returns for a radar site.

3.3.1.4 SCAN ORIENTED QUALITY CONTROL(SOQC)

This function monitors radar inputs and checks for missing, excessive and erroneous data. Whenever a failed radar is detected, this SOQC information shall be immediately passed onto and printed out on the CDT SMS. information shall indicate which radar/subchannel has failed. Radar/subchannel printout format will conform with printout requirments contained in paragraph 3.22 and paragraph 3.23 of this supplement. Upon return to normal operating condition of a previously failed radar, the radar sort box radar assignments(i.e., preferred, supplementary) are adjusted. Reestablishment of a preferred radar which has failed will be made only through manual supervisory keyboard entry from the console data terminal system monitor station.

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3.6.13 DISPLAY OF STATION ALTIMETER

The number of station altimeters, up to seven(7) per display position shall be available for display and shall be defined in site adaptation. Controller shall be able to inhibit or select any or all of these seven (7) altimeters from his/her display.

3.7 KEYBOARD ENTRIES REQUIREMENTS

3.7.1 SLEW DATA

In the current EARTS system, radar trackball coordinates refer to a sensor orientation on each display. In the Mosaic EARTS system, radar trackball coordinate data refer to a system coordinate orientation. Home position of the slew ball shall be the display center, regardless of the position of the range select switch or off-set.

The EARTS automatic home feature of the trackball symbol which occurs upon completion of slew to a point and keyboard entry of "enter" shall be modified so that the symbol does not return to center of the PVD but remains at last point of slew.

3.7.2 RADAR SORT BOX(RSB) DISPLAY

Functional requirement exists for supervisory PVD keyboard entry to request radar sort box related data. That data shall be displayed in the readout area of the entering supervisory positon. The following data will be included in the readout:

(1) RSB number

(2) Preferred beacon site

(3) Preferred radar site

(4) Alternate ~~preferred~~ beacon site

(5) Alternate ~~preferred~~ radar site

(6) Supplemental beacon site

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Functional requirement exists for supervisory PVD keyboard entry to request radar sort box related data. That data shall be displayed in the readout area of the entering supervisory positon. The following data will be included in the readout:

(1) RSB number

(2) Preferred beacon site

(3) Preferred radar site

(4) Alternate ~~preferred~~ beacon site

(5) Alternate ~~preferred~~ radar site

(6) Supplemental beacon site

(7) Supplemental radar site

(8) Altimeter station adapted

(9) Radar suppression, if selected .

3.11 PROGRAM ADAPTATION FOR INTERFACILITY COMMUNICATIONS

Interfacility communications shall be incorporated into the mosaic software program, Mosaic EARTS shall be able to interface with ARTS II and ARTS III. Also, NAS Stage-A en-route centers shall be able to interface with EARTS. Documentation, listing and source tapes describing the interfacility comunications software program to be incorporated into mosaic EARTS shall be provided by FAA to the contractor at contract award. See Appendix C

3.12 CERTIFICATION

Contractor shall implement the features of system certification identified at Appendix B. Source listings shall be provided contractor. Those certification performance functions described at Appendix B shall be adapted by the contractor in order to properly interface with mosaic EARTS.

3.13 ASSISTANCE TO SEARCH AND RESCUE

This function will use the existing continuous data recording(CDR) system. The CDR editor will be used to search through CDR for a specific set of target reports or series of target reports. The received target report shall be used in the generation of the plots. A graphic plot of target data will be presented on the medium speed printer(MSP) using system coordinates to show the last reported target report and prediction of possible aircraft location. An extract and plot of fixes from the gee-map may be used as an aid to making the search and rescue function more usable. This shall be an off-line program.

3.14 MSP AND CDT PRINT-OUT CAPABILITY

Appendix D lists details of types of data to be printed on MSP and on CDT.

3.15 CDT SMS CAPABILITY

See Appendix E for details.

3.16 INTEGRATED INTERFACE TEST(IIT) ERROR CODES

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3.24 MISCELLANEOUS

The capability shall be provided to simultaneous record on CDR(continuous data recording) tracking data(TD) with either the active track file(AC) or the flight data file(FC). Since the impact of simultaneously recording these items would result in more rapidly using the available space set aside for continuous data recording, the capability will be provided to select or inhibit this option.

The on-call capability shall be provided which displays on PVD a count of the number of CD, ARSR-3 DTE, or MAR digitizer created test targets at a specified range, as well as displaying the test targets, which are used as the basis for narrow-band radar system MDS. Normally a radar system MDS is accomplished on a weekly basis or when it is believed that the radar system has degraded below normal levels. This requires a signal input to create 32 test targets. The signal is reduced until only 16 targets are displayed. It is difficult to visually count the targets let alone know when one scan has been completed. Output' to the sensor oriented PVD will be "periods" at full brightness for radar only targets current position and a count of target reports/scan. The PVD will be assigned to the sensor subject to MDS activity. Only one sensor may have this function performed at a given time.

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Test: Test Message status

FAA: Message Used by FAA

AF: Message Used by Air Force

SRC: Radar Channel(1=A, 0=B)

SBC: Beacon Channel(1=A, 0=B)

CDA: CD Processing Alarm

OBA: On-Line Beacon Alarm

BO: ½ NMI Beacon Offset

AIM: AIMS Alarm

CP: Circular Polarization

SBA: Standby Beacon Alarm

ORA: On-Line RBPM Alarm

OS: Output Service

- HPG:HPG Alarm

SO: System Overheat

MTA: Military Timing Alarm

MIMA: MIM Alarm

BRA: Beacon RTQC Alarm

SRA: Search RTQC Alarm

RA: Range Alarm

SD:

	Bit Pattern	
	21	20
ACE Off	0	0
ACE 1	1	0
ACE 2	0	1
ACE 3	1	1

MXRL: Maximum Run Length Discrimination On

MNRL: Minimum Run Length Discrimination On

ASA: Azimuth/Servo Alarm

NMO: Norma! Map On

SMO: Sensitive Map On

WFO: WFMU On

WFA: WFMU Alarm

DRO: Dynamic Run Length On

HST: High Speed Timing

HSI: Half Scan Inhibit

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DC1: Data Channel 1 On

d. The capability should be provided through the use of a supervisory keyboard entry and use of EQARS such that an individual may be able to slew out to a target symbol and obtain CD input data from that target report. If the target report is currently associated with an active track then the function should be capable of automatically updating the report data(CD input data) information each time the track correlates. An area should be set aside large enough that will be capable of containing up to but not exceeding a total of ten(10) reports which could consist of from one(1) to three(3) different tracks. CD data should be displayed as follows:

(1). UT for untracked target.

(2). No Data for no data.

(3). Scans should be numbered consecutively.

(4). After table which contains the ten(10) reports is full, capability should be provided to over-write oldest information.

(5). Capability should be provided to selectively delete any or all of the tracks being upadated.

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Class III(Cont'd):

SENSOR x BEACON CHANNEL B

SENSOR x CD PROCESSING ALARM

SENSOR x ON-LINE BEACON ALARM

SENSOR x ½ NMI BEACON OFFSET

SENSOR x AIMS ALARM

SENSOR x CIRCULAR POLARIZATION

SENSOR x STANDBY BEACON ALARM

SENSOR x ON-LINE RBPM ALARM

SENSOR x OUTPUT SERVICE

SENSOR x HPG ALARM

SENSOR x SYSTEM OVERHEAT

SENSOR x MILITARY TIMING ALARM

SENSOR x MIM ALARM

SENSOR x BEACON RTQC ALARM

SENSOR x SEARCH RTQC ALARM

SENSOR x RANGE ALARM

SENSOR x ACE OFF

SENSOR x ACE 1

SENSOR x ACE 2

SENSOR x ACE 3

SENSOR x MAX RUN LENGTH DISCRIMINATION ON

SENSOR X MIN RUN LENGTH DISCRIMINATION ON

SENSOR x AZIMUTH/SERVO ALARM

Class III(Cont'd):

SENSOR x BEACON CHANNEL B

SENSOR x CD PROCESSING ALARM

SENSOR x ON-LINE BEACON ALARM

SENSOR x ½ NMI BEACON OFFSET

SENSOR x AIMS ALARM

SENSOR x CIRCULAR POLARIZATION

SENSOR x STANDBY BEACON ALARM

SENSOR x ON-LINE RBPM ALARM

SENSOR x OUTPUT SERVICE

SENSOR x HPG ALARM

SENSOR x SYSTEM OVERHEAT

SENSOR x MILITARY TIMING ALARM

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SENSOR x ACE 3

SENSOR x MAX RUN LENGTH DISCRIMINATION ON

SENSOR X MIN RUN LENGTH DISCRIMINATION ON

SENSOR x AZIMUTH/SERVO ALARM

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APPENDIX D(CONT'D)

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SENSOR x AZIMUTH/SERVO ALARM

j. Military Timing Alarm

k. System Overhead

l. HPG Alarm

m. Output Service

n. AIMS Alarm

o. CD Processing Alarm

p. Standby Beacon Alarm

q. On-Line Beacon Alarm

r. Beacon Sector Tolerance

s. Beacon Test Out

t. Radar Test Out

u. Radar Receiver Adapter Error Messages which result in disabling RRA's such as:

(1) Disabling-due to "NO DATA"

(2) Disabling due to "PARITY ERRORS"

(3) Disabling due to "INPUT TIMING"

(4) Disabling due to "OUT-OF-SYNC"

(5) Disabling due to "ILLEGAL MESSAGE"

v. CDR fail

w. CDR capacity

x. Disc subsystem failure

7. Contractor will insure that capability exists to be able to add to the number of alarm messages associated with the CDT alarm system.

j. Military Timing Alarm

k. System Overhead

l. HPG Alarm

m. Output Service

n. AIMS Alarm

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